

Role of the Primary Care Safety Net in Pandemic Influenza

An influenza pandemic would have a disproportionately adverse impact on minority populations, the poor, the uninsured, and those living in underserved communities. Primary care practices serving the underserved would face special challenges in an influenza pandemic.

Although not a formalized system, components of the primary care safety net include federally qualified health centers, public hospital clinics, volunteer or free clinics, and some local public health units. In the event of an influenza pandemic, the primary care safety net is needed to treat vulnerable populations and to provide health care surge capacity to prevent the overwhelming of hospital emergency departments.

We examined the strength, capacity, and preparedness of key components of the primary care safety net in responding to pandemic influenza. (*Am J Public Health*. 2009;99:S316–S323. doi:10.2105/AJPH.2009.161125)

George Rust, MD, MPH, Mollie Melbourne, MPH, MEP, Benedict I. Truman, MD, MPH, Elvan Daniels, MD, MPH, Yvonne Fry-Johnson, MD, MSCR, and Thomas Curtin, MD

PRIMARY CARE PRACTICES

play a central role in treating influenza. The Agency for Healthcare Research and Quality estimates that 14.2 million persons contracted seasonal influenza from 2001 through 2003, accounting for 5 million outpatient visits in each of those years.¹ Molinari et al. provide a much higher estimate of influenza-specific health care use: 31.4 million outpatient visits per year.² Researchers in Great Britain estimate that each community there could expect 1570 to 3135 additional visits to primary care practices per 100 000 population during the peak week of a pandemic.³ Primary care practices that serve underserved populations (racial and ethnic minority populations, the poor, the uninsured, and those living in underserved rural and inner-city communities) would face unique challenges.⁴ These challenges include the health centers' own limitations (lack of financial reserves or clinical capacity), system limitations (limited connections between public health and primary care), and patient-level barriers (low literacy, mistrust of the health care system, limited English proficiency, lack of health insurance, and lack of cash for out-of-pocket expenses).

Health care practices serving these underserved and high-disparity patient populations are often referred to as the primary care safety net, although in most communities they are not tied together in a formalized system. Major components of the primary care safety net include public hospital

network clinics, volunteer or free clinics, some local public health units, and federally qualified health centers, which include migrant and community health centers, health care for the homeless programs, and public housing clinics. Migrant health centers have played a specific role in diagnosing, treating, and preventing spread of the recent influenza A(H1N1) "swine flu" in Hispanic and Latino immigrant communities.

Primary care practices provide an infrastructure for delivering immunizations, antiviral therapies, and treatment of complications. A primary care safety net with surge capacity to meet the added demand for services during an influenza pandemic could lessen demand on emergency departments. Conversely, if the primary care safety net becomes overwhelmed, the overflow is likely to fall on emergency departments. Primary care practices can also be a part of early warning systems for recognizing sudden increases in the incidence of influenzalike illness, but only if they are intentionally connected to a larger public health surveillance infrastructure. Finally, because of their unique "consumer-majority" governance structure (i.e., at least 51% of their governing board members must be patients who use the clinic's services), federally qualified health centers can serve as a uniquely trusted source of health information in minority communities.⁴

These communities may be especially vulnerable during an influenza pandemic.⁵ For example,

minority racial and ethnic groups and the uninsured have lower rates of influenza vaccination.⁶ Racial/ethnic disparities in influenza immunization rates have been projected to account each year for an estimated 1880 excess minority deaths and more than 33 000 years of potential life lost.⁷ All of these disparities could potentially be intensified in an influenza pandemic.

Health outcomes for these individuals may depend on their access to a well-prepared primary care safety net that has adequate surge capacity and vibrant connections to hospitals and pharmacy distribution channels. For an influenza pandemic, gaps in access to primary care can lead to delays in diagnosis and treatment of pneumonia and other complications. We describe the populations who would need primary care safety net services, the organizational components of the safety net, and its role in responding to pandemic influenza. We also offer recommendations for improving the capacity and preparedness of the primary care safety net to respond to pandemic influenza.

VULNERABLE POPULATIONS

Those in greatest need of a primary care safety net during an influenza pandemic include the uninsured, the poor, racial and ethnic minority populations, persons with limited English proficiency, persons with mental and physical disabilities, and all persons living in underserved communities.

There are 46 million uninsured people in the United States. Uninsured rates in each state vary from a low of 8.5% in Minnesota to a high of 24.1% in Texas and vary dramatically by race, ethnicity, and age: 10.7% among non-Hispanic Whites, 19.4% among African Americans, and 32.7% among Hispanics and Latinos.⁸ The uninsured are more likely to defer needed care and use an emergency department. More than half (52%) of the uninsured do not have a primary care medical home or other usual source of care,⁹ suggesting a -profound need to expand the capacity of the primary care safety net at baseline, as well as to establish mechanisms for dramatically expanding surge capacity for nationwide emergencies such as pandemic influenza.

Whether insured or uninsured, people living in poverty are also particularly vulnerable during health disasters. They are less likely to have a usual source of care, to have received an influenza vaccine, or to have insurance coverage, and they have higher rates of chronic disease. In 2006, 36.5 million Americans (12.3%) lived in poverty, but poverty rates were 3 times higher for African Americans (24.3%) than for Whites (8.2%). The poverty rate for Hispanic and Latino families was 20.6%.

Many other Americans live in underserved rural or inner-city communities with inadequate availability of primary care services. The National Association of Community Health Centers estimates that there are 56 million “medically disenfranchised” Americans (18.8% of the US population); this term comprises the uninsured as well as individuals who live in designated Health

Professions Shortage Areas or Medically Underserved Areas or belong to a medically underserved population such as migrant farm workers.¹⁰

Uninsured and racial/ethnic minority populations use office-based outpatient services at substantially lower rates.¹¹ Minority populations are subjected to multiple risks, including neighborhood poverty, higher rates of being uninsured, and lack of culturally and linguistically appropriate services. Poverty and lack of a primary care home exacerbate these disparities. Even within a high-disparity racial group, there are six- to eightfold differences in the use of office visits and needed medications between low-income, uninsured African Americans and more affluent, well-insured African Americans.¹² Life-saving treatments such as antiviral therapy for HIV/AIDS can actually increase Black–White disparities in mortality because White populations are better able to access new antiviral treatments.^{13,14} We have recently found a similar pattern of racial disparity in the treatment of seasonal influenza with disease-modifying antiviral drugs among the disabled in Georgia’s Medicaid population.¹⁵

MAIN COMPONENTS OF THE PRIMARY CARE SAFETY NET

Components of our US health care system that would be available to serve the needs of uninsured and underserved populations may be conceptualized as the primary care safety net (Table 1), although no formal system connects these diverse components and, in some communities, health needs may already exceed their capacity.

Federally Qualified Health Centers

Federally qualified health centers (FQHCs) include community health centers, migrant health centers, homeless health centers, and public housing clinics. FQHCs receive 71 million visits each year from over 18 million persons, 7 million of whom are uninsured. According to the 2007 Uniform Data System, about 3 in 4 of these patients are either uninsured (39%) or use Medicaid (35%), and most (70%) live in households with a family income at or below the federal poverty level. FQHC patients are 3 times more likely than the general population to have limited English proficiency.¹⁷ Nearly 2 million of these patients are migrant farm workers or homeless persons.

There are 1200 FQHC organizations in the nation, with more than 7000 clinic sites in rural and inner-city settings in all 50 states. Staffing includes roughly 8000 physicians, 9300 nurses, and 4700 nonphysician primary care providers.¹⁸ FQHCs also employ 3400 mental health and substance abuse specialists and 11000 of the culturally relevant health educators, translators, and outreach workers essential for reaching out to immigrant, minority, low-income, and other potentially vulnerable populations.

FQHCs have a unique ability to meet the needs of underserved populations and to decompress overcrowded emergency rooms. We recently found a 30% absolute excess of uninsured emergency department visits in rural counties without an FQHC compared with counties that did have a health center.¹⁹ In effect, FQHCs provide the right care to each patient in the right setting at the

right time. They also have a unique ability to provide care that is free of disparities. Although vaccine shortages have challenged FQHCs, these shortages did not lead to racial disparities in immunization patterns for urban health centers that are accustomed to serving these populations.^{20,21}

Although each FQHC is an independent, community-governed organization, they are loosely tied together through 52 state or territorial primary care associations, which also receive federal funding. Although 88% of these associations have a seat on their state senior advisory committee for the federal Hospital Preparedness Program, only 30 (58%) received funding either from this program or from the Centers for Disease Control and Prevention’s (CDC’s) Public Health Preparedness Program in 2007. Only \$11.1 million (0.7%) of the \$1.56 billion in health care and public health emergency-management funding nationwide went to FQHCs and state primary care associations in fiscal year 2006.²² Examples of coordinated planning to prevent an overwhelmed health care system include Connecticut’s statewide all-hazards planning process, which includes 31 acute-care hospitals as well as Department of Veterans Affairs hospitals, psychiatric facilities, and all 13 state community health center organizations.²³

Rural Health Clinics

Over 3000 federally certified rural health clinics receive special Medicare reimbursement for services that include hiring nurse practitioners and physician assistants to address health professional shortages in underserved rural communities.²⁴ However, these rural health clinics are typically smaller

TABLE 1—Overview of the Primary Care Safety Net

Safety Net Organization	Funding Sources	No. of Organizations	National Organization
Federally qualified health centers	Sections 329 and 330 of Public Health Service Act (USC 42 [1946]) plus enhanced cost-based Medicare and Medicaid reimbursement	1200 health center organizations with over 7000 clinical delivery sites	National Association of Community Health Centers
Public hospital outpatient clinics	Local tax base plus Medicare and Medicaid reimbursement	97 acute-care public hospitals	National Association of Public Hospitals and Health Systems
Rural health clinics	Enhanced cost-based Medicare and Medicaid reimbursement	Over 3000 federally certified rural health clinics	National Association of Rural Health Clinics
Local public health departments	Public health block grants, categorical funding, and county funding	2794 local health departments in 50 states and District of Columbia	National Association of County and City Health Officers
Volunteer clinics and free clinics	In-kind (volunteer staffing) and private contributions	More than 1200 free clinics in the US (NAFC estimate)	National Association of Free Clinics (NAFC)
Emergency departments	Hospital-subsidized indigent care (with or without local tax-based support), not-for-profit community benefit, and Medicare and Medicaid reimbursement	4828 emergency departments in 2005 based on National Emergency Department Inventory ¹⁶	American Hospital Association; American College of Emergency Physicians

practices that do not receive additional grant funding to support care for uninsured patients, even though they serve high-need communities. In Georgia, rural counties with a rural health clinic actually demonstrated a *higher* rate of uninsured emergency department visits than even rural counties with no safety net clinic at all.¹⁹ Without additional funding or staffing, rural health clinics would have limited surge capacity for pandemic influenza.

Urban Public Hospital Clinics

Public hospitals and health systems represent an important pillar of the safety net in the United States. These hospital-centered health systems often operate neighborhood health centers and hospital-based primary care clinics, typically in large urban areas. These clinic networks have the advantage of being part of larger systems of care connected to safety net emergency departments and hospital-based care.²⁵ In 2007, the National Association of Public Hospitals reported that their

members received more than 34 million nonemergency outpatient visits, 42% of which were for primary care services.²⁶ These hospitals also received over 6 million emergency department visits. According to data generated in the Robert Wood Johnson Foundation's Urgent Matters project, more than half of all visits to the emergency room of a typical urban public hospital were for primary care treatable or preventable conditions.²⁷

Most public hospitals are actively engaged in disaster planning, especially because they serve as regional trauma centers. Unfortunately, urban public hospitals face tremendous financial challenges and resource constraints. Thirty percent of public hospitals report physician shortages and more than 3 of 4 (77%) report shortages of registered nurses.²⁸ These hospitals have surge capacity plans that include use of associated ambulatory care sites, but more than 1 in 5 hospitals (21%) said they would not have sufficient antiviral medicines even for the first 72 hours

of a pandemic. Further, 39% of hospitals did not believe that they could mobilize sufficient numbers of trained staff to handle a 25% increase in demand for services.²⁹

Faith-Based, Volunteer, and Free Clinic Networks

A key strength of faith-based, volunteer, and free clinics in serving the underserved is their ability to mobilize volunteer nurses and physicians from private practice or retirement to serve uninsured and underserved clients. These clinics also typically operate with low overhead by limiting their involvement with third-party payers.

In some communities, the impact is substantial. An audit of Georgia's free clinic network sites showed that they provided \$200 million to \$400 million in health care services to approximately 140 000 individuals (just less than 10% of Georgia's uninsured population). Still, surge capacity is problematic. Although some charitable clinics are open full-time, the average free clinic in Georgia was open only 9.5 hours

per week. In 2006, these clinics reported turning away 30 000 individuals because of lack of capacity.³⁰

This sector is very hard to quantify because limited data are available to assess their utilization or capacity. Clinics may operate with no public funding or reporting requirements. They often lack information systems for counting services delivered and may cap services because of limited volunteer capacity. Pharmacy supply is often limited to drug samples from private-practice donations, pharmaceutical access programs, or limited physician dispensing.

Private-Practice Physicians and Commercial Walk-In Clinics

Beyond volunteering in clinic settings, private-practice physicians may provide a substantial surge capacity to treat patients during an influenza pandemic in their own practices, just as they often manage much higher patient volumes during seasonal influenza outbreaks. However, if access is not convenient or timely, emergency

department visits may increase greatly.³¹ Anantham et al. have summarized the potential role of private-practice physicians and the clinical, financial, and legal risks they may encounter in responding to pandemic influenza.³² A study in Ottawa, Ontario, suggested that although family physicians were willing to be part of a larger public health disaster response, fewer than 1 in 5 (18%) felt prepared to deal with a respiratory pandemic.³³

In addition, there is a new segment of the health care delivery system: an estimated 1200 limited-scope walk-in clinics referred to by their trade association as convenient-care clinics. The Convenient Care Association reports that these clinics have provided over 3.5 million outpatient visits since 2000.³⁴ The close relationship of these clinics to drugstore chains, which often have established protocols for “drive-up flu shots,” may create unique opportunities for patients with the financial means to pay out-of-pocket for their health needs, but may be less useful to uninsured and low-income segments of the population.

Local Public Health Departments

Public health departments are an important resource and coordinator of emergency response to disasters, especially for communicable disease pandemics. In the 2003–2004 National Ambulatory Medical Care Survey, more than half of physicians (56%) reported that they would contact state or local public health officials for assistance in communicable disease diagnosis.³⁵ However, local health units vary widely in their organizational structure, local oversight, and range of clinical services.³⁶ In a national survey,

less than 20% of local health departments reported directly providing comprehensive primary care clinical services,³⁷ whereas 73% reported that this was a function of nongovernment organizations in their communities.³⁸ Unfortunately, there is little national data available on the volume of such comprehensive primary care services offered to uninsured and other disadvantaged populations through local public health units. Although public health funding has increased dramatically for pandemic preparedness (specific allocations of \$3.3 billion in fiscal year 2006 and \$2.3 billion in fiscal year 2007 for the National Strategy for Pandemic Influenza),³⁹ overall public health infrastructure has significantly weakened over the past 20 years.⁴⁰

One additional concern throughout the safety net is the likelihood that existing capacity may diminish, rather than increase, in response to a need for pandemic-related surge capacity. Clinical staff providing some primary care may be retasked with public health roles during a pandemic. Nearly half of the local health department workers participating in a 2005 survey reported that they were not likely to report to work during a hypothetical pandemic, a figure that might also present similar challenges to other segments of the primary care safety net.⁴¹

Emergency Departments

In the decade leading up to 2003, visits to US emergency departments increased by 26% while more than 400 emergency departments actually closed.⁴² In 2002, 62% of all surveyed hospitals nationwide reported that their emergency departments

were at or over operating capacity, with significant hours of ambulance diversion.⁴³ In Los Angeles County, California, hours of diversion of emergency medical services peaked during severe influenza seasons.⁴⁴ A study from the University of Toronto showed that emergency department ambulance diversion might increase by 2.5 hours per emergency department for every 100 cases of influenza in the community, and that during influenza seasons, 24.3% of observed weekly ambulance diversion was attributable to influenza.⁴⁵

Emergency departments become “a safety net for the safety net” when primary care systems fail, especially for the underserved. Although rural hospitals may have insufficient facilities and resources to manage disaster events,⁴⁶ the overcrowding of most urban emergency departments suggests that there is likely insufficient surge capacity to manage the demand that would develop early in an influenza pandemic. In fact, we do not know what the appropriate thresholds of surge capacity should be. A metric derived from trauma-care models would be the capacity to care for 500 victims stricken with an infectious disease per 1 million population in 24 hours.⁴⁷ Estimates published by the British National Health Service suggest that a pandemic could generate as many as 25 000 to 50 000 cases of influenza per 100 000 population over a 3- to 4-month period, which would then generate 7000 to 14 000 primary care office visits and 1000 to 2000 hospital admissions.⁴⁸ For the United States, this would represent a midrange estimate of roughly 3 million pandemic-related office visits throughout the country,

14.5% by uninsured patients and 13.7% by patients with no usual source of primary care.⁴⁹ Forty percent of these clinic visits would be generated in just a 2-week peak period and 80% during a 6- to 8-week window.

A more appropriate use of health care delivery capacity would require pre-established protocols for diversion of noncritical pandemic influenza patients from emergency departments to primary care, assuming that primary care health centers could create some additional capacity. Mechanisms for creating surge capacity on short notice could include clearing appointment books of nonurgent or preventive care visits, increasing nurse roles in triage and use of standing orders for vaccination and antiviral treatment, and precredentialing volunteer clinical staff.

ROLE OF THE PRIMARY CARE SAFETY NET IN PANDEMIC INFLUENZA

Triage and Treatment

The first role of the primary care safety net in an influenza pandemic will be to triage and treat influenzalike illness with disease-modifying antiviral therapies. In the 2006/07 season, a random survey found that 53.8% of primary care physicians reported prescribing antiviral therapy to at least some patients with influenza-like illness, although 17.8% of the treating physicians used amantadine and 8.7% used rimantadine, neither of which is currently recommended because of high levels of resistance.⁵⁰ Patient-level encounters in the disabled segment of Georgia's Medicaid population showed very low rates of treatment (fewer than 1 in 5 Whites and 1 in 15 African Americans with a diagnosis of influenza

received antiviral treatment).¹⁵ We cannot determine whether this reflects underprescribing or delays in accessing treatment beyond the 48-hour window from onset of symptoms needed to make antiviral therapy effective.

To the extent that primary care practices can also diagnose and treat influenza complications such as pneumonia, they will provide an essential infrastructure to decrease the burden on local emergency departments. Primary care health centers can be a component of local public health response, and they may also offer unique capabilities such as mobile medical vans, telemedicine services, and mental health services for patients and for providers. In addition to caring directly for influenza patients, safety net health centers will need to sustain the ongoing delivery of primary care to adults and children with other acute illnesses and chronic disease, as well as prenatal care for pregnant women. Pandemic influenza is likely to foster increased patient demand at the very time when influenza cases among health care professionals and other clinic staff may limit surge capacity.

Pharmacy Services

Neighborhood clinics of urban public hospitals are often connected to a larger pharmacy infrastructure of their health system. Many FQHCs also have their own pharmacy or contracted pharmacy services, including share-the-care bulk purchasing and 340B discounted pricing programs.⁵¹ These pharmacy programs are potential distribution channels for antiviral medications, vaccines, and other essential supplies, including ones that are stored in the Strategic National Stockpile (SNS) program.^{52,53} As of September 2008,

the SNS contained nearly 50 million regimens of antiviral drugs such as oseltamivir or zanamivir and more than 150 million protective masks. The SNS program goal is to deliver materials anywhere in the United States within 12 or fewer hours of a request from state officials, but state and local health care professionals must distribute and dispense the materials to the public. Specific plans and effective implementation are needed to ensure that users of primary care safety net services receive a fair share of SNS assets in a timely, equitable manner when needed.

Vaccine Delivery

Once a supply of vaccine is made available (for example, if there is a reemergence of the H1N1 “swine flu” outbreak in the fall–winter of 2009–2010), primary care practices could also provide an essential vaccine delivery infrastructure with trained nurses, cold-storage procedures, and even standing orders. This capacity could be maximized by an ongoing, aggressive partnership between local public health units and safety net primary care organizations to eliminate adult immunization disparities, especially with regard to underuse of seasonal influenza vaccine. Most primary care practices could improve influenza vaccination rates throughout their patient population by adopting more standardized approaches, including vaccine standing orders, preventive services checklists, and team approaches.⁵⁴ The impact of influenza vaccinations on rates of influenzalike illness can vary dramatically from year to year depending on the relative predominance of influenza A(H3N2), the emergence of drifted strains, and the antigenic match of the

vaccine to circulating influenza strains.⁵⁵

Surveillance

Safety net health centers could potentially take on a surveillance role as well. Primary care practices serving vulnerable populations could provide an early warning system for recognizing sudden increases in the incidence of influenzalike illness, as well as serving as point of collection sites for viral swabs or rapid-testing kits to detect the emergence of unusual strains, but only if they are integrated into public health surveillance networks well in advance of a pandemic. The effectiveness of emergency departments for influenza surveillance has previously been reported,^{56,57} but at least 1 study suggests that daily surveillance of primary care office visits shows an earlier spike related to seasonal influenza than do emergency department visits.⁵⁸ In a random survey of primary care providers, 69% reported ordering an influenza test (mostly rapid-antigen tests) on at least 1 patient with influenzalike illness during the 2006–2007 flu season. New York and other states have already included primary care practice sites in their surveillance system, but some additional community health networks with strong clinical information systems (especially in communities with high rates of international travel) could provide unique value as a part of such surveillance networks.

Trusted Sources of Information

Perhaps the most important role of the primary care safety net will be for health center staff members to serve as trusted sources of health information, especially in

communities where history and racial experience have led to mistrust.⁵⁹ Health centers with consumer-majority boards (as required for all FQHCs) represent trusted community-owned organizations. Similarly, professionals who represent the racial/ethnic diversity of the populations they serve will be most effective.

For example, during the H1N1 outbreak of spring 2009, trusted organizations serving migrant and seasonal farm worker communities (Migrant Clinicians Network, National Association of Community Health Centers, and National Center for Farmworker Health) transmitted CDC public health messages and bilingual patient education tools through daily e-mails to groups such as migrant health center chief executive officers, migrant health clinicians, state and regional migrant health coordinators, academic and community migrant health researchers, and a binational working group. In addition, an H1N1 patient-tracking component was added to the Migrant Clinicians Network’s existing transborder patient navigation system to facilitate the transfer of medical records and maintain communication with migrants possibly exposed to H1N1, and to link these individuals to needed health care. For an outbreak with epidemiological roots in Mexico, this was a pivotal segment of the population to reach, not just for their own benefit but for the overall health of our nation.⁶⁰

LIMITATIONS OF SAFETY NET EFFECTIVENESS IN A PANDEMIC

Unfortunately, even during interpandemic periods, many Americans report barriers in obtaining timely access to primary

care services, and these barriers are directly associated with an increased likelihood of using emergency departments.³¹ These challenges multiply during a pandemic. The workforce is a major issue. Safety net primary care centers already do not have the number of health care professionals they need, and the primary care workforce has not grown to keep pace with increased funding and newly added clinic sites for FQHCs. The National Association of Community Health Centers estimates that health centers would need an additional 15 585 primary care providers and 11 553 nurses to enable health centers to serve 30 million people by 2015, and 51 299 providers plus at least 37 981 nurses to serve all medically underserved people.⁶¹

Certain practical matters will be essential to the success of this primary care safety net response, such as the simple ability of health professionals to maintain disciplined infection-control practices. A study of primary care clinics and emergency departments in King County, Washington, revealed major deficits in their adherence to practices recommended by the CDC, such as washing hands and using masks, with nursing staff generally performing better than physicians.⁶² Other practical matters include the rapid delivery of masks, rapid diagnostic test kits, and antiviral drugs in the first few days of a local outbreak. Testing these delivery mechanisms in advance rather than waiting for the urgency of an outbreak would seem prudent.

Multilevel organizational dynamics and even politics can also create potential challenges if not negotiated in advance. For example, some states or local authorities may designate mainly hospitals as surge sites, neglecting to

designate primary care community health center networks. Different states also may have different levels of autonomy between state, district, and county health authorities. Such “home rule” jurisdictional issues require that pandemic planning not only be top-down (i.e., state mandates) but also bottom-up (i.e., locally negotiated and operationalized partnerships).

RECOMMENDATIONS

Possible steps for strengthening the ability of the primary care safety net to respond to and prepare for pandemic influenza include the following.

Primary care safety net assessment. Develop a primary care safety net assessment for every county and parish in the United States. Identify counties with no visible primary care safety net other than a hospital emergency department, and measure the gap between need and capacity in counties with existing primary care safety net clinics.

Virtual stress tests. Conduct virtual “stress tests,” using pandemic modeling techniques to assess safety net capacity at the local community level.

Increase safety net capacity. Increase urgently the safety net’s capacity to provide a primary care health home to every one of the 56 million Americans currently uninsured or living in an underserved community.

Build safety net organizations. Build primary care safety net organizations in communities with no existing safety net; expand primary care capacity in counties with organizations but inadequate capacity.

Integrate primary care safety net providers in pandemic influenza plan. Work with the public health

system to integrate primary care safety net providers in pandemic influenza plans and resource allocation for every county in the United States. Each local plan must include written memorandum of agreement between local public health departments and the primary care safety net (FQHCs, rural health clinics, free clinics, public hospital clinics, and so on) as well as hospital emergency departments and inpatient units.

Create a culturally representative professional workforce. Expand the workforce of culturally diverse nurses, physicians, pharmacists, and mental health professionals to staff the primary care safety net. Ensure that they have sufficient surge capacity to provide culturally and linguistically appropriate services to vulnerable populations in an influenza pandemic.

Hire and train culturally relevant community health workers. Until appropriate multicultural, multilingual diversity can be achieved in the health professional workforce, train and employ (i.e., fund) a cadre of culturally and linguistically relevant community health workers linked to primary care and public health agencies.

Direct mechanisms and logistical infrastructure. Develop direct mechanisms and logistical infrastructure to deliver vaccines, antiviral pharmaceuticals, and other assets from the SNS to FQHCs and other primary care safety net providers.

Planning. Avoid paper-based plans that might lack real-world practicality. Instead, seek to achieve the immediate practical benefit of these plans by building active programs and partnerships between local public health departments and the primary care safety net to prevent and control

complications of seasonal influenza.

Benchmarks. Use the elimination of seasonal influenza disparities in vulnerable populations and underserved communities as a benchmark of community preparedness for an influenza pandemic.

CONCLUSIONS

Improving surge capacity and preparedness of the primary care safety net, while building bridges between public health and primary care, will be an essential element of our nation’s success or failure in responding to pandemic influenza. Community health centers and other components of this safety net have a unique ability to deliver culturally relevant, disparity-free care to underserved populations, but many of the components of this safety net are underfunded and understaffed. These gaps in resources will severely hamper their capacity to respond over extended periods of time to acute illness in vulnerable populations spread over large geographic areas.

About the Authors

George Rust, Elvan Daniels, and Yvonne Fry-Johnson are with the National Center for Primary Care, Morehouse School of Medicine, Atlanta, GA. Mollie Melbourne and Thomas Curtin are with the National Association of Community Health Centers, Bethesda, MD. Benedict I. Truman is with the Office of Minority Health and Health Disparities, Centers for Disease Control and Prevention (CDC), Atlanta.

Correspondence should be sent to George Rust, MD, National Center for Primary Care, Morehouse School of Medicine, 720 Westview Dr, Atlanta, GA 30310 (e-mail: grust@msm.edu). Reprints can be ordered at <http://www.ajph.org> by clicking on the “Reprints/Eprints” link.

This essay was accepted June 15, 2009.

Note. The findings and conclusions in this essay are those of the authors and do not necessarily represent the official position of the CDC or the Agency for Toxic Substances and Disease Registry.

Moreover, this essay includes the statements of invited authors convened by the CDC for the purpose of obtaining their input. Such statements also do not necessarily represent the views of the CDC.

Contributors

G. Rust served as principal author, playing a lead role in drafting the article, while coordinating input from relevant constituents and coauthors. M. Melbourne, B.I. Truman, E. Daniels, Y. Fry-Johnson, and T. Curtin provided additional facts and perspectives from primary care and public health stakeholders and contributed to the writing and editing of sequential drafts of the manuscript.

References

- Soni A, Hill SC. *Average Annual Health Care Use and Expenses for Influenza, 2001–2003*. Rockville, MD: Agency for Healthcare Research and Quality; March 2006. Statistical Brief 116. Available at: http://meps.ahrq.gov/mepsweb/data_files/publications/st116/stat116.pdf. Accessed July 15, 2009.
- Molinari NA, Ortega-Sanchez IR, Messonnier ML, et al. The annual impact of seasonal influenza in the US: measuring disease burden and costs. *Vaccine*. 2007; 25(27):5086–5096.
- Pandemic Influenza Preparedness Team, Department of Health. Pandemic influenza: surge capacity and prioritisation in health services—provisional UK guidance. Table 2: expected healthcare demand during the peak week of a pandemic. November 2007. Available at: http://www.dh.gov.uk/en/publication/sandstatistics/publications/publicationspolicyandguidance/DH_080744. Accessed June 3, 2009.
- Barrett R, Brown PJ. Stigma in the time of influenza: social and institutional response to pandemic emergencies. *J Infect Dis*. 2008;197(suppl 1):S34–S37.
- Blumenshine P, Reingold A, Egarter S, Mockenhaupt R, Braveman P, Marks J. Pandemic influenza planning in the United States from a health disparities perspective. *Emerg Infect Dis*. 2008; 14(5):709–715.
- Link MW, Ahluwalia IB, Euler GL, Bridges CB, Chu SY, Wortley PM. Racial and ethnic disparities in influenza vaccination coverage among adults during the 2004–2005 season. *Am J Epidemiol*. 2006;163(6):571–578.
- Fiscella K, Dressler R, Meldrum S, Holt K. Impact of influenza vaccination disparities on elderly mortality in the United States. *Prev Med*. 2007;45(1): 83–87.
- DeNavas-Walt C, Proctor BD, Smith J. *Income, Poverty, and Health Insurance Coverage in the United States: 2006*. Washington, DC: US Census Bureau; 2007.
- Rhoades JA. *Access to Care and Use of Preventive Services, 2002: Estimates for the US Civilian Noninstitutionalized Population, Age 18 to 64*. Rockville, MD: Agency for Healthcare Research and Quality; June 2005. Statistical Brief 82. Available at: <http://www.meps.ahrq.gov/papers/st82/stat82.pdf>. Accessed July 15, 2009.
- National Association of Community Health Centers. Access denied: a look at America's medically disenfranchised. Available at: http://www.nachc.com/client/documents/issues-advocacy/policy-library/research-data/research-reports/Access_Denied42407.pdf. Accessed Sept 26, 2008.
- Ezzati-Rice TM, Rohde F. *Variation in Ambulatory Health Care Visits and Visits for General Checkup by Demographic Characteristics and Insurance Status, US Civilian Noninstitutionalized Population Ages 18–64, 2005*. Rockville, MD: Agency for Healthcare Research and Quality; March 2008. Statistical Brief 201. Available at: http://www.meps.ahrq.gov/mepsweb/data_files/publications/sb201/stat201.pdf. Accessed July 15, 2009.
- Rust G, Fryer GE, Strothers H, Daniels E, McCann J, Satcher D. Modifiable determinants of health care utilization within the African-American population. *J Natl Med Assoc*. 2004;96(9): 1169–1177.
- King WD, Minor P, Ramirez Kitchen C, et al. Racial, gender and geographic disparities of antiretroviral treatment among US Medicaid enrollees in 1998. *J Epidemiol Community Health*. 2008;62(9): 798–803.
- Levine RS, Briggs NC, Kilbourne BS, et al. Black–white mortality from HIV in the United States before and after introduction of highly active antiretroviral therapy in 1996. *Am J Public Health*. 2007;97(10):1884–1892.
- Leon K, McDonald MC, Moore B, Rust G. Disparities in influenza treatment among disabled Medicaid patients in Georgia. *Am J Public Health*. 2009; 99(Suppl 2):S378–S382.
- Emergency Medicine Network. National Emergency Department Inventory. Available at: <http://www.emnet-usa.org/medi/USA.htm>. Accessed June 3, 2009.
- National Association of Community Health Centers. A sketch of community health centers: chart book 2009. Figures 1.1–1.5. Available at: http://www.nachc.com/client/documents/Chartbook_Update_20091.pdf. Accessed June 3, 2009.
- National Association of Community Health Centers. America's Health Centers. Fact sheet, March 2009. Available at: www.nachc.com/client/documents/America's_Health_Centers_updated_3.09.pdf. Accessed June 3, 2009.
- Rust G, Baltrus P, Ye J, et al. Presence of a community health center and uninsured emergency department visit rates in rural counties. *J Rural Health*. 2009;25(1):8–16.
- Zimmerman RK, Tabbarah M, Nowalk MP, et al. Impact of the 2004 influenza vaccine shortage on patients from inner city health centers. *J Urban Health*. 2007;84(3):389–399.
- Appel A, Everhart R, Mehler PS, MacKenzie TD. Lack of ethnic disparities in adult immunization rates among underserved older patients in an urban public health system. *Med Care*. 2006; 44(11):1054–1058.
- Association of State and Territorial Health Officials, National Association of County and City Health Officials, National Association of Community Health Centers. Collaborating with community health centers for preparedness, p. 7. Available at: http://www.nachc.com/client/Collaborating_with_Community_Health_Centers_for_Preparedness.pdf. Accessed September 26, 2008.
- Duley MG. The next pandemic: anticipating an overwhelmed health care system. *Yale J Biol Med*. 2005;78(5): 355–362.
- National Association of Rural Health Clinics. Rural health clinics, fact sheet. Available at: http://www.narhc.org/about_us/about_us.php. Accessed June 3, 2009.
- Pickens S, Boumbulian P, Anderson RJ, Ross S, Phillips S. Community-oriented primary care in action: a Dallas story. *Am J Public Health*. 2002;92(11): 1728–1732.
- National Association of Public Hospitals and Health Systems. America's Public Hospitals and Health Systems. 2007. Results of the Annual NAPH Hospital Characteristics Survey (Interim Report), December 2008, p. 1. Available at: http://www.naph.org/Content/ContentGroups/Hot_Topic/Characteristics2007Interim.pdf. Accessed July 15, 2009.
- Urgent Matters Project. An assessment of the safety net in Atlanta, Georgia, p. 24. George Washington University. Available at: http://urgentmatters.org/media/file/aboutProject_reports_Final_Atlanta.pdf. Accessed September 15, 2008.
- National Association of Public Hospitals and Health Systems. Hospital staffing and surge capacity during a disaster event. Research brief, May 2007. Available at: <http://www.naph.org/naph/publications/HospitalStaffingAndSurgeCapacityDuringADisasterEvent.pdf>. Accessed July 15, 2009.
- National Public Health and Hospital Institute. Research brief: findings from the NPHHI Preliminary Emergency Preparedness Survey. National Association of Public Hospitals and Health Systems, Washington, DC, September 2006. Available at: <http://www.naph.org/naph/publications/FindingsFromTheNpHHIPreliminaryEmergencyPreparednessSurvey.pdf>. Accessed July 15, 2009.
- Darnell J. GFCN Facts. Georgia Free Clinic Network, 2006. Available at: <http://www.gfcn.org/facts.php>. Accessed September 26, 2008.
- Rust G, Ye J, Baltrus P, Daniels E, Adesunloye B, Fryer GE. Practical barriers to timely primary care access: impact on adult use of emergency department services. *Arch Intern Med*. 2008;168(15): 1705–1710.
- Anantham D, McHugh W, O'Neill S, Forrow L. Clinical review: influenza pandemic—physicians and their obligations. *Crit Care*. 2008;12(3):217.
- Hogg W, Huston P, Martin C, Soto E. Enhancing public health response to respiratory epidemics: are family physicians ready and willing to help? *Can Fam Physician*. 2006;52(10):1254–1260.
- Convenient Care Association. About CCA. Available at: http://www.ccaclinics.org/index.php?option=com_content&view=article&id=4&Itemid=11. Accessed June 3, 2009.
- Niska RW, Burt CW. National Ambulatory Medical Care Survey: terrorism preparedness among office-based physicians, United States, 2003–2004. *Adv Data*. 2007;(390):1–10.
- Beitsch LM, Grigg M, Menachemi N, Brooks RG. Roles of local public health agencies within the state public health system. *J Public Health Manag Pract*. 2006;12(3):232–241.
- National Association of County and City Health Officials. National profile of local health departments. Figure 7.12: governmental agencies providing other health services, p. 50. July 2006. Available at: http://www.naccho.org/topics/infrastructure/profile/upload/NACCHO_report_final_000.pdf. Accessed June 3, 2009.
- National Association of County and City Health Officials. National profile of local health departments. Figure 7.4: activities and services most frequently provided only by non-governmental organizations, p. 45. July 2006. Available

- at: http://www.naccho.org/topics/infrastructure/profile/upload/NACCHO_report_final_000.pdf. Accessed June 3, 2009.
39. Dept of Health and Human Services. Budget in brief, fiscal year 2007, p. 101. Available at: <http://archive.hhs.gov/budget/07budget/2007BudgetInBrief.pdf>. Accessed June 3, 2009.
40. Baker EL, Potter MA, Jones DL, et al. The public health infrastructure and our nation's health. *Annu Rev Public Health*. 2005;26:303–318.
41. Balicer RD, Omer SB, Barnett DJ, Everly GS Jr. Survey of local public health workers' perceptions toward responding to an influenza pandemic. *J Healthc Prot Manage*. 2006;22(2):1–14.
42. Asplin BR, Flottesmesch TJ, Gordon BD. Developing models for patient flow and daily surge capacity research. *Acad Emerg Med*. 2006;13(11):1109–1113.
43. Lewin Group. *Emergency Department Overload: A Growing Crisis: The Results of the American Hospital Association Survey of Emergency Department (ED) and Hospital Capacity*. Falls Church, VA: American Hospital Association; 2002.
44. Glaser CA, Gilliam S, Thompson WW, et al. Medical care capacity for influenza outbreaks, Los Angeles. *Emerg Infect Dis*. 2002;8(6):569–574.
45. Schull MJ, Mamdani MM, Fang J. Community influenza outbreaks and emergency department ambulance diversion. *Ann Emerg Med*. 2004;44(1):61–67.
46. Edwards JC, Kang J, Silenas R. Promoting regional disaster preparedness among rural hospitals. *J Rural Health*. 2008;24(3):321–325.
47. Schultz CH, Koenig KL. State of research in high-consequence hospital surge capacity. *Acad Emerg Med*. 2006;13(11):1153–1156.
48. Pandemic Influenza Preparedness Team, Department of Health. Pandemic influenza: surge capacity and prioritisation in health services—provisional UK guidance. Table 1: expected healthcare demand over the course of a pandemic. November 2007. Available at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080744. Accessed June 3, 2009.
49. National Center for Health Statistics. Early release of selected estimates based on data from the January–September 2008 National Health Interview Survey, Tables 1 and 2. Centers for Disease Control and Prevention, March 25, 2009. Available at: <http://www.cdc.gov/nchs/about/major/nhis/released200903.htm#2>. Accessed June 3, 2009.
50. Influenza-testing and antiviral-agent prescribing practices—Connecticut, Minnesota, New Mexico, and New York, 2006–07 influenza season. *MMWR Wkly Rep*. 2008;57(03):61–65. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5703a1.htm>. Accessed June 1, 2009.
51. Dept of Health and Human Services, Health Resources and Services Administration. Introduction to 340B Drug Pricing Program. Available at: <http://www.hrsa.gov/opa/introduction.htm>. Accessed July 15, 2009.
52. Esbitt D. The Strategic National Stockpile: roles and responsibilities of health care professionals for receiving the stockpile assets. *Disaster Manag Response*. 2003;1(3):68–70.
53. Malatino EM. Strategic National Stockpile: overview and ventilator assets. *Respir Care*. 2008;53(1):91–95, discussion 95.
54. Rust G, Strothers HS 3rd, Zimmerman RK. Re-engineering the primary care practice to eliminate adult immunization disparities. *Ethn Dis*. 2005;15(2 suppl 3):S3-21–S3-26.
55. Bridges CB, Thompson WW, Meltzer MI, et al. Effectiveness and cost-benefit of influenza vaccination of healthy working adults: a randomized controlled trial. *JAMA*. 2000;284(13):1655–1663.
56. Zheng W, Aitken R, Muscatello DJ, Churches T. Potential for early warning of viral influenza activity in the community by monitoring clinical diagnoses of influenza in hospital emergency departments. *BMC Public Health*. 2007;7:250.
57. Olson DR, Heffernan RT, Paladini M, Konty K, Weiss D, Mostashari F. Monitoring the impact of influenza by age: emergency department fever and respiratory complaint surveillance in New York City. *PLoS Med*. 2007;4(8):e247.
58. Sloane PD, MacFarquhar JK, Sickbert-Bennett E, et al. Syndromic surveillance for emerging infections in office practice using billing data. *Ann Fam Med*. 2006;4(4):351–358.
59. Burnett M, Genao I, Wong WF. Race, culture, and trust: why should I take a shot if I'm not sick? *Ethn Dis*. 2005;15(2 suppl 3):S3-13–S3-16.
60. Update: infections with a swine-origin influenza A (H1N1) virus—United States and other countries, April 28, 2009. *MMWR Morb Mortal Wkly Rep*. 2009;58:431–433.
61. National Association of Community Health Centers and the Robert Graham Center. Access transformed: building a primary care workforce for the 21st century, p. 4. August 2008. Available at: <http://www.nachc.com/client/documents/ACCESS%20Transformed%20full%20report.PDF>. Accessed September 26, 2008.
62. Turnberg W, Daniell W, Seixas N, et al. Appraisal of recommended respiratory infection control practices in primary care and emergency department settings. *Am J Infect Control*. 2008;36(4):268–275.